

Main Article

DIAGNOSTIC SIGNIFICANCE OF NASAL EOSINOPHILIA IN ALLERGIC RHINITIS

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ABSTRACT: *Background:* Nasal eosinophilia is one of the potential tests for substantiating the diagnosis of allergic rhinitis.

Objective: The aim was to establish the validity of nasal eosinophilia in allergic rhinitis, to study its various clinical correlates and interpret it in context of skin sensitivity pattern.

Study Design: Prospective case study.

Setting: Hospital based.

Patients: The patients were selected on the basis of history and clinical examination and were from the Himalayan region.

Intervention: Diagnostic.

Methods: The patients and the equal number of controls, were subjected to nasal smear for eosinophilia and intra-dermal skin tests to various allergens.

Results: Overall, eighty percent of nasal smears were positive in various degrees among the cases. Around eighty-eight percent of cases showed both smear and skin test positivity, thereby signifying a high degree of harmony among them and further validating and confirming the diagnosis of allergic rhinitis.

Conclusion: Nasal eosinophilia was found to be a useful diagnostic test in allergic rhinitis, with a moderately high sensitivity and a high specificity.

Key Words: Allergic rhinitis; Nasal eosinophilia; Nasal smear

INTRODUCTION

The diagnosis of allergic rhinitis is a multi-factorial process. In addition to an exhaustive history and a good clinical examination, various tests are used as adjuncts to substantiate the diagnosis. Nasal eosinophilia, though not pathognomonic, is one of them and is interpreted as an additional confirmation of nasal allergy. Mygind¹ had observed that after intra-nasal challenge by an allergen, eosinophilia is demonstrable from the challenged and not the contralateral nostril. The present study was undertaken to see the importance of the presence of eosinophils in nasal secretions in patients of allergic rhinitis and its co-relation with the other parameters.

MATERIALS AND METHODS

Forty patients suffering from allergic rhinitis, diagnosed on the basis of history and clinical examination, were selected for the study. Patients with chronic illness, sinusitis, on immunotherapy treatment; and those taking local or systemic corticosteroids were excluded from the study. An equal number of controls, well matched for age and sex, having no history of allergy and not suffering from any chronic illness, were selected.

A detailed history was taken along with the categorization

of the patients into various types of nasal allergy. The relevant physical examination was carried out with special emphasis on the type of discharge and the colour of nasal mucosa. The skin tests, by the intradermal method, to various allergens were carried out. Nasal smears were studied for eosinophilia. The smears were collected by scraping the mucous membrane of the inferior meatus with a cotton applicator, air-dried, stained with May-Grunwald and Giemsa (MGG) stain and rinsed in tap water. Discolouration with alcohol was done followed again by rinsing in water. After drying, they were examined under the oil immersion (Figure 1).

Interpretation of nasal eosinophilia was done as per the scale in Table 1.¹

RESULTS

The mean age of the study population was 28.02 (SD 1.39) years with the overall sex distribution not very significant with 55% females as compared to 45% males. The distribution of the type of nasal allergy was not much varied, each showing almost comparable number of cases [Seasonal 13 (32.5%); Perennial 14 (35%) and seasonally exacerbated 10 (25%)]. 3 cases (7.5%) were not classified because the

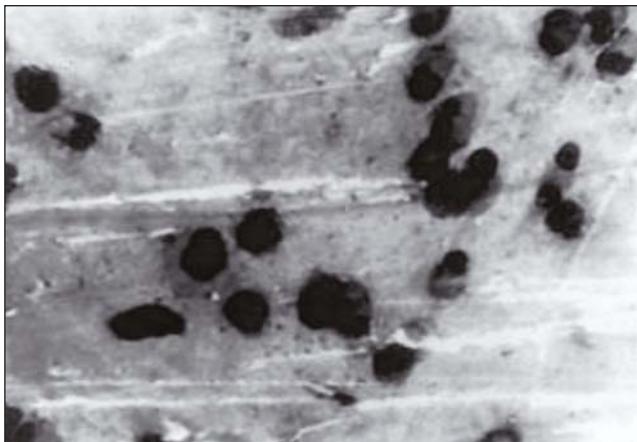


Figure 1: Nasal smear showing the presence of large number of eosinophils in a mucosal background. [MGG stain, x 1000].

Table 1: Scale used to interpret nasal eosinophilia

+	< 5% eosinophils	No eosinophilia	Normal
+	> 5% eosinophils	Slight eosinophilia	Doubtful
++	< 50% eosinophils	Moderate eosinophilia	Pathological
+++	>50% eosinophils	Marked eosinophilia	Pathological

duration of the disease was less than 1 year.

Nasal smear was carried out in all the cases and results were found as in Table 2. Overall, 80% of the nasal smears were positive in various degrees. In the control group only 2 cases (5%) showed any kind of positivity and that too limited to 5 to 10% group.

Various correlations of the nasal eosinophilia with other parameters were done. The correlation with the disease type was as shown in Table 3. The eosinophilia was related to the type of nasal discharge (Table 4) and the colour of nasal mucosa (Table 5) also. Correlation of the skin tests and nasal

Table 2: Frequency distribution of nasal smears for eosinophilia

Eosinophil % in nasal smear	No. of cases	%
< 5% (-)	8	20
5-10% (+)	10	25
< 50% (++)	13	32.5
> 50% (+++)	9	22.5
Total	40	100

smears was also done. (Table 6)

DISCUSSION

The correlation between clinical allergy and nasal smear eosinophilia was first emphasized by Eyermann.² He reported a series of 92 cases with allergic rhinitis in which the nasal secretions were obtained from the anterior tip of the middle turbinate and found that 72% showed eosinophils in the nasal secretions.

Different ways of grading the eosinophilic response have been used; some advocating qualitative assessment on the basis of the number of eosinophils seen per high field, and others making a semi-quantitative assessment by taking an overall survey of the percentage of eosinophils per 100 leucocytes. The exact estimation, though diagnostic, is unreliable because of uneven distribution of the nasal secretion specimen.³

It is a generally known fact that in the various shock organs or tissues in which the lesions of allergy occur, the pathological picture is characterized by edema and eosinophilic infiltration. Allergic reactions in the target tissue cause the liberation of various pharmacologically active chemical mediators,⁴ including the eosinophil chemotactic

Table 3: Nasal smear eosinophilia Vs. Disease Type

Disease type	Eosinophilia in nasal smear				Total
	<5% (-)	5-10% (+)	<50% (++)	>50% (+++)	
Seasonal	3	5	3	2	13
Perennial	1	4	6	3	14
Seasonally exacerbated	2	1	3	4	10
Total	6	10	12	9	37

P > 0.05 (P=0.5167); Not significant.

Table 4: Nasal smear eosinophilia Vs. Type of nasal discharge

Type of discharge	Eosinophilia in nasal smear				Total
	<5% (-)	5-10% (+)	<50% (++)	>50% (+++)	
Watery	5	3	7	9	24
Mucoid	3	7	5	0	15
Mucopurulent	0	0	1	0	1
Total	8	10	13	9	40

P = 0.0564

Table 5: Nasal smear eosinophilia Vs. Colour of nasal mucosa

Colour of nasal mucosa	Eosinophilia in nasal smear				Total
	<5% (-)	5-10% (+)	<50% (++)	>50% (+++)	
Dull red	5	4	6	5	20
Pale	2	5	4	4	15
Greyish blue	1	1	3	0	5
Total	8	10	13	9	40

P=0.6895

Table 6: Skin tests Vs. Nasal smears

Skin tests	Nasal smears	
	Positive	Negative
Positive	24 (87.88%)	4 (12.12%)
Negative	3 (42.86%)	4 (57.14%)

P=0.04

factor for anaphylaxis (ECF-A) which leads to the congregation of eosinophil leucocytes in the local sites. The eosinophilia in the nasal secretions depends on the efficiency of transfer of eosinophil leucocytes between the blood and target tissues and secretions.⁵

In the present study, the positive nasal smear eosinophilia, graded semi-quantitatively, was found in 80% of the cases and only in 5% of the controls; and that too mildly positive. When correlated with the disease type, no typical pattern was seen and hence the degree of nasal smear positivity for eosinophilia could not be graded according to the disease type. In a study of 30 patients with allergic rhinitis,⁶ nasal eosinophilia was detected in 80% of the specimens taken from the middle and inferior turbinates. Bhandari and Baldwa⁷ found nasal smear positivity for the eosinophil leucocyte to be in 81.6% of the cases and only 5% of the controls. When they classified this for the disease type pattern, they also did not find much significant difference.

Bryan and Bryan⁸ concluded that the increased numbers of eosinophils are found in the nasal mucosa in active allergic nasal disease. In contrast, the normal nasal mucosal cytology usually demonstrates no eosinophilia or basophilic cells. High degree of correlation between the nasal allergy and nasal eosinophilia was also demonstrated by Sasaki et al.⁹ In a study by Malmberg et al,¹⁰ a significant correlation was obtained between the secretion eosinophilia and nasal allergy. They also stressed that multiple nasal specimens be obtained before ruling out the presence of nasal eosinophilia.

Lowell³ has commented that the relationship between an appropriate exposure and eosinophilia is seen with such regularity that one is tempted to conclude that even those patients who have eosinophilia but who lack skin reactivity, have eosinophilia because of an allergenic exposure. On this basis, they even classified perennial rhinitis into two groups viz. perennial rhinitis skin test positive and perennial rhinitis skin test negative. Miller et al¹¹ found positive nasal smears in 45% of the cases and 5% of the controls and concluded that the nasal smears for eosinophils is a reliable test with high sensitivity and high specificity. Urmil et al¹² found nasal eosinophilia in about 90% of the cases and in none of the controls.

Matching of nasal eosinophilia with the type of nasal discharge was found to be of borderline significance only (Table 4). In other words, the type of nasal discharge was not a very good predictor of the percentage and the positivity rate of eosinophilia in the nasal smear sample. Though the patients with watery type of discharge were more likely to have higher percentage of eosinophils in their samples. Also, no significant link was found between the nasal smear eosinophilia and colour of the nasal mucosa, thereby meaning they were independent of each other. In a study by Lans et al,¹³ 43 percent of the patients with allergic rhinitis had nasal eosinophilia, when greater than 20 percent of the sampled cells as eosinophils were considered significant. They also found no significant correlation of symptoms and signs with nasal eosinophilia in the subjects, and concluded that the nasal smear for eosinophils is an insensitive but specific test for the diagnosis of allergic rhinitis.

When nasal smear eosinophilia was compared with the skin tests, a high degree of correlation was seen. Around 88 percent of the cases had both the tests positive, thereby being complimentary to each other and further substantiating the diagnosis of allergic rhinitis. Also, a few false positive and false negative cases, 3 and 4 respectively, were seen (Table 6). The cause for this has been discussed by Malmberg and Holopainen.¹⁰ They state that an infection may cause a small number of eosinophils to appear in the nasal secretion of non-allergic persons. And also, conversely, it may cause a temporary disappearance of the eosinophils from the secretions of persons with allergic rhinitis.¹⁴ They also deduced that many nasal smears may be necessary in doubtful cases before classifying it as negative or positive for nasal smear eosinophilia. The other reason for few false positive cases may be the failure to test the specific allergen to which the patient is sensitive or it being a case of non-allergic rhinitis with eosinophilia syndrome (NARES). The percentage of correlation between the nasal smear eosinophilia and skin tests in our study was around 88%

whereas in a similar study,¹⁵ it was around 72%.

Nasal eosinophilia has been shown to be a pointer towards the development of subsequent nasal symptoms, as has been elucidated by a study by Okano et al.¹⁶ They inferred that the nasal smear examination may be a potentially valuable test to predict prolonged or recurrent allergic rhinitis.

It can be concluded from the present study, that the nasal smear for eosinophil appears to be a reliable diagnostic test with moderately high sensitivity and high specificity. Though, with a word of caution, that it should be interpreted along with the information available by careful history and physical examination.

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